NAV-2100

GLOBAL POSITIONING SYSTEM RECEIVER CHIPSET

EIGHT-CHANNEL GPSR CHIPSET FOR SYSTEMS INTEGRATORS AND OEMS

The **NAV-2100**, is an 8-channel Global positioning System Receiver chipset, designed around a programmable platform, Analog Devices' fixed-point Digital Signal Processor (DSP).

The NAV-2100 reference design consists of:

- Two Digital Signal Processors
- Boot Memory EPROM (256K x 8)
- 2- SRAM (8K x 8)
- 2 - EEPROM (256K x 8)
- Gate Array 3K Gate

The NAV-2100, along with any standard RF front end and GPS antenna, makes a complete GPS receiver.
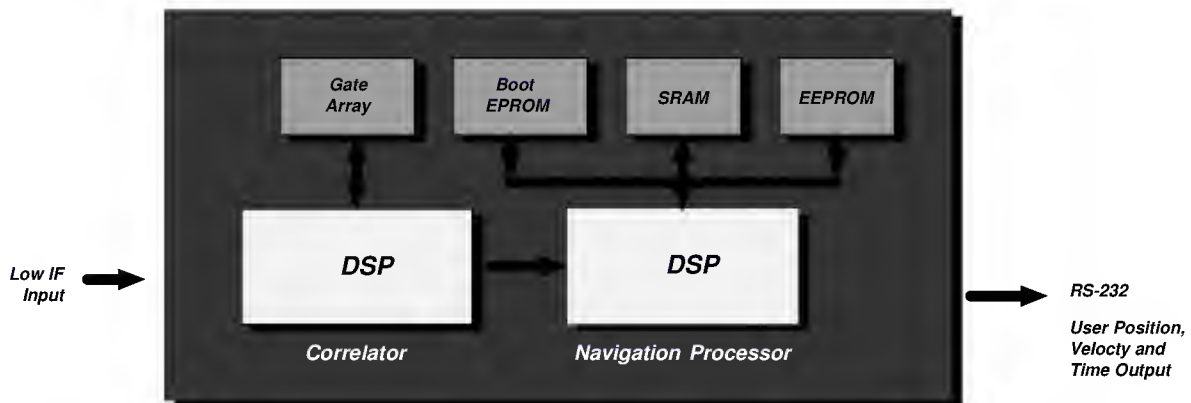
This receiver design consists of two major functional processors:
- Correlator
- Navigation Processor

HIGHLIGHTS

- **Eight parallel channels**
- **Includes two programmable DSP platforms**
- **Adaptable to any standard RF front end**
- **Soft solution approach for correlation**
- **Efficient algorithms for very low time to first fix**
- **17 geodetic data**
- **Computes user's position, velocity and time**
- **Real-time differential GPS compatibility**
- **Direct support for RS-232 serial link**
- **Designed for easy customization of applications**
- **Easy upgradability and expandability**
- **Provides with powerful user interface software for PC-AT (Accord's GVISION*) enabling navigation and guidance functions**

* GVISION is a GPSR user interface software product from Accord Software & Systems Pvt. Ltd.

Low IF Input → [Gate Array] [Boot EPROM] [SRAM] [EEPROM] / [DSP Correlator] → [DSP Navigation Processor] → RS-232 User Position, Velocty and Time Output

NAV-2100 Chipset

CORRELATOR

The main functions of the included Correlator are:

- Parallel processing of eight channels

- Carrier frequency generation

- C/A code generation for 32 satellites

- Acquisition of carrier frequency and code phase

- Correlation of On-time and Dither samples

- Interface to Navigation Processor

NAV-2100 — AN IDEAL BUILDING BLOCK FOR OEM APPLICATIONS

The NAV-2100, with its programmable interface and the spare processing power forms an ideal building block for versatile OEM applications. This approach minimizes the additional processing hardware requirements for integrated GPS based OEM applications resulting in a cost-effective end product.

- Interface with Correlator

- Extraction of navigation messages

- Satellite database management

- Satellite selection for position solution

- Computation of Position, Velocity and Time

- Non-volatile memory for storing Almanac, Ephemeris and Position data

- Host communications

NAV-2100-BASED GPS RECEIVER

ADI's reference GPS Receiver design based on the ADI NAV-2100 chipset, uses GEC Plessey's® GP2010 RF front end and an active GPS antenna (ANP-C-114-5. M/A COM). The reference includes GVISION, user interface software from *Accord Software & Systems Pvt., Ltd*, which runs on industry standard PC.

GPS Receiver based on NAV-2100 Chipset
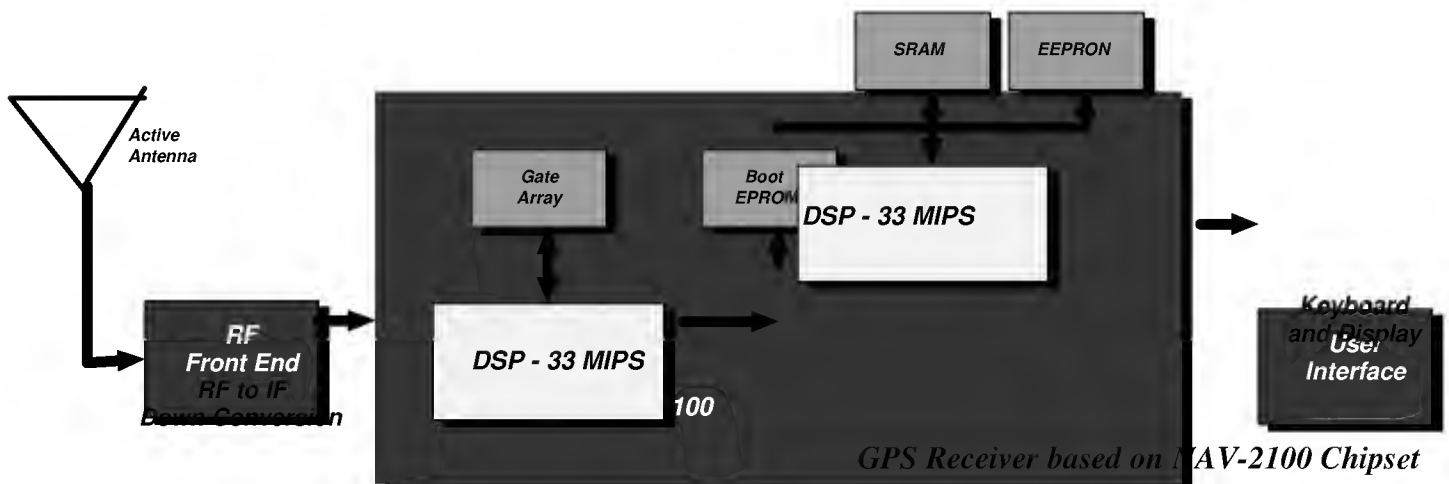
NAVIGATION PROCESSOR

The main functions of the included Navigation processor are :

- Measurement of pseudo range

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NAV-2100 REFERENCE DESIGN BOARD

ADI's NAV-2100 Reference Design Board - Rev 2.0 has the following specifications:

GENERAL CHARACTERISTICS

- Eight C/A correlation channels
- Processes GPS L1 signal @ 1575.42 MHz

- Carrier aided tracking
- Fast acquisition techniques

- Real-time executive based software architecture
- NMEA0183 compatible message format for host communication

- Uses the Accord software and systems (PUT.LTD) custom binary message format for host communication
- Real-time Differential GPS compatibility

PERFORMANCE CHARACTERISTICS

Time to First Fix
- With almanac, position and time estimate: 45 sec. typical
- Without almanac, time, or position   90 sec. typical

Position Accuracy
- Less than 30 meters with CEP 50% (without S/A)
- Less than 50 meters with CEP 90% (without S/A)

Dynamics
- Velocity   600 m/sec
- Acceleration   4g
- Jerk $4m/sec^3$

Acquisition
- Less than 24 seconds (without aid)
- Less than 16 seconds (with aid)

Re-acquisition
- 2-3 seconds typical

Satellite Data Collection
- 6 seconds to 9 seconds for synchronization
- Continuous data collection and parity checking on all eight channels

Position Solution
- 2D/3D position, velocity and time
- 47 geodetic datum supported (default WGS84)

NAV-2100 SPECIFICATIONS

APPLICATION INTERFACE

The Real Time Executive of the ADI NAV-2100 provides a programmable interface to integrate OEM application software.

PC HOST COMMUNICATION

- Interface   RS-232 compatible
- Baud rate   9600 baud
- Message format   NMEA0183 Version 2.00
                     ASCII custom binary output HEX

OUTPUT MESSAGES

User's Present Position, Latitude, Longitude, Altitude, ECEF coordinates, Velocity, Heading, Time, DOP, Error estimate, Satellite used for last fix, Receiver status, Satellite data, Error messages, Signal strength, Almanac, Ephemeris, Satellite health status.

INPUT MESSAGES

Force satellite re-selection, Master reset, Override satellite health, Almanac, Position, Time and Date.

ELECTRICAL CHARACTERISTICS

- Power Supply
  Voltage: +5V ±0.25V

- Power Consumption 2.5 watts (approximate)

PHYSICAL CHARACTERISTICS

- Dimensions   100mm x 100mm x 20mm

- Connectors   RF signal input through SMA jack
                     2 pin power supply connector

ENVIRONMENTAL CHARACTERISTICS

- Ambient Temp.   -10º C to +85º C

- Humidity   95% non condensing
                     +30ºC to +60ºC

- Altitude   18,000 meters

MISCELLANEOUS

- Optional Features   Built-in modem, Gyro Sensor Interface

NAV-2100 EVALUATION KIT

The ADI NAV-2100 evaluation kit consist of:

Item No.	Description
1.	NAV-2100 reference design board - Rev 2.0 with DC-DC converter (input = +9V +16V, output = +5V) housed in an enclosure.
2.	Antenna (ANP-C-114-5 from M/ACOM).
3.	Antenna cable (3 meters long) with SMA connectors at both ends and RS-232 cable.
4.	GVISION user interface software on a 3 1/2" floppy diskette.
5.	NAV-2100 User Manual

Analog Devices, Inc., together with *Accord Software & Systems Pvt. Ltd.* (designer of GVISION - a GPSR user interface), is developing the most advanced system receiver solutions today. *Accord* is based in Bangalore, India.

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